

CLAIMS

What is claimed is:

1. A brushless permanent magnet electric machine, comprising:
a stator assembly including a stator core that defines $(12 \times n)$ slots, stator teeth having a generally "T"-shaped cross section, and winding wire wound around said stator teeth, wherein a radially outer edge of said stator teeth defines crowned surface; and
a rotor including permanent magnets defining $(12 \pm 2)n$ poles, wherein n is an integer greater than zero.
2. The brushless permanent magnet electric machine of claim 1 wherein said stator is located inside of said rotor.
3. The brushless permanent magnet electric machine of claim 1 wherein said stator core is formed by a plurality of stacked stator laminations.
4. The brushless permanent magnet electric machine of claim 1 wherein a first radius of said crowned surface is less than a second radius defined by a circle that is tangent to a radially outermost point of said crowned surface of said stator teeth.

5. The brushless permanent magnet electric machine of claim 1 wherein a slot opening is an angle between circumferential facing edges of adjacent stator teeth and a tooth pitch is an angle between centers of adjacent stator teeth and wherein said slot opening is within a range of 10% to 20% of said tooth pitch.

6. The brushless permanent magnet electric machine of claim 1 wherein a first air gap between an end of said crowned surface and said permanent magnets is within a range of 1.25 to 2.00 times a second air gap between a center of said crowned surface and said permanent magnets.

7. An inside-out brushless permanent magnet electric machine, comprising:
an internal stator assembly including a stator core that defines $(12 \times n)$ slots, stator teeth having a generally “T”-shaped cross section, and winding wire wound around said stator teeth, wherein a radially outer edge of said stator teeth defines a crowned surface; and
an external rotor assembly that rotates about said internal stator assembly and that includes permanent magnets defining $(12 \pm 2)n$ poles, wherein n is an integer greater than zero.
8. The inside-out brushless permanent magnet electric machine of claim 7 wherein said stator core is formed by a plurality of stacked stator laminations.
9. The inside-out brushless permanent magnet electric machine of claim 7 wherein a first radius of said crowned surface is less than a second radius defined by a circle that is tangent to a radially outermost point of said crowned surface of said stator teeth.
10. The inside-out brushless permanent magnet electric machine of claim 7 wherein a slot opening is an angle between circumferential facing edges of adjacent stator teeth and tooth pitch is an angle between centers of adjacent stator teeth, and wherein said slot opening is within a range of 10% to 20% of said tooth pitch.

11. The inside-out brushless permanent magnet electric machine of claim 7 wherein a first air gap between an end of said crowned surface and said permanent magnets is within a range of 1.25 to 2.00 times a second air gap between a center of said crowned surface and said permanent magnets.

12. A brushless permanent magnet electric machine, comprising:

a stator assembly including a stator core that defines $(12 \times n)$ slots, stator teeth having a generally "T"-shaped cross section, and winding wire wound around said stator teeth, wherein a radially outer edge of said stator teeth defines a crowned surface, and a slot opening between adjacent stator teeth is at least 10% of a tooth pitch of said adjacent stator teeth; and

a rotor including permanent magnets defining $(12 \pm 2)n$ poles, wherein n is an integer greater than zero.

13. The brushless permanent magnet electric machine of claim 12 wherein said stator is located inside of said rotor.

14. The brushless permanent magnet electric machine of claim 12 wherein said stator core is formed by a plurality of stacked stator laminations.

15. The brushless permanent magnet electric machine of claim 12 wherein a first radius of said crowned surface is less than a second radius defined by a circle that is tangent to a radially outermost point of said crowned surface of said stator teeth.

16. The brushless permanent magnet electric machine of claim 12 wherein said slot opening is within a range of 10% to 20% of said tooth pitch.

17. The brushless permanent magnet electric machine of claim 12 wherein a first air gap between an end of said crowned surface and said permanent magnets is within a range of 1.25 to 2.00 times a second air gap between a center of said crowned surface and said permanent magnets.